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THE USE OF FIELD TELEPHONES IN THE FIELD

BY
A. G. GRINLING
LIEUT. 2/1ST HERTS REGT.

LONDON
HUGH REES, LTD.
5 REGENT STREET, PALL MALL, S.W.
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INTRODUCTION

"It is a matter of common knowledge that the object of any field or ordinary telephone is to enable two people to talk to one another at a distance which is outside the range of their voices." It is only possible to do this when a "current" is passing through each of the instruments in use, and when those communicating are both in a stationary position.

The activities of modern warfare are ceaseless day and night, throughout all seasons. Every commander of the smallest force must be in a position, at all times, to communicate with his superior and subordinate commanders. Co-operation in warfare is the essential to success. The telephone, therefore, plays a very great part in the present war, as it is one of the first forms of communication in which neither party need be in visual touch with the other. The possibilities and difficulties of using the telephone in the field are numerous, and it is the aim of this little book to help Signalling Officers, especially Regimental Signalling Officers, when using it.

Before doing this, it may be a help to enumerate a few useful hints in telephone working in the elementary stages.

THE USE OF FIELD TELEPHONES IN THE FIELD

I

TELEPHONES

1. Telephone Drill

EQUIPMENT.

1. Portable telephone and connecting leads.
2. Pouch containing cutting pliers, sandpaper, rubber strip, and square binding screw.
3. Clasp knife.
4. Message book, pencil.
5. Two complete reels of cable in case.

OPERATORS.

Method of laying cables.

The squad is fallen in and numbered from right to left, and then told off in groups of 4 men each.

No. 1, who is base operator, takes the end of the cable from No. 2 and connects to the free terminal of his telephone. He inserts earth pin.

No. 2 puts on the leather gloves, unrolls about 5 yards of cable from drum, and hands end to No. 1.

No. 3 takes crook stick and ties the cable to

some natural holdfast, if one is available, to prevent any strain on the cable.

No. 4 takes the crook stick and prepares to assist to lay the cable.

On the command "Quick march," No. 1 remains with the instrument (winding cable round his feet).

No. 2 lays cable reeling out of the drum.

No. 3 goes behind with crook stick.

No. 4 helps generally. On seeing that the cable must cross a road, he calls out "bury crossing" or "tree crossing."

REELING UP.

1. Reeling up is by far the most difficult work the section will have to do, and to perform it efficiently requires that the whole detachment work together.

2. On the C1, or "disconnect," or on the intimation that the cable can be reeled up, the man in charge of the station, or the operator who receives the message, will give the command "pack up"; before doing so, he will inform the base.

3. On the command "Commence work," No. 4 stands to the handle of the winding, and gets the drum ready.

No. 3 assists No. 4 and takes the crook stick. No. 2 moves in advance of the detachment and "clears" the line to make it easy to pick up.

2. Laying the Cable

It is impossible to lay down hard-and-fast rules as to how cable shall be laid, but the following may be a guide, as being possible methods:

1. Bury Crossing.
2. Road Crossing.
3. House Crossing.
4. Tree Crossing.
5. Field Crossing.

1. "Bury" Crossing may be used when wires have to be laid for some considerable time. It is tedious work, and should not be used when other methods are possible.

For temporary use, wire may be "buried" by pegging it to the side of a dry trench or ditch.

2. "Road" Crossings are of two kinds: under the road, which is simply a "buried" crossing, or over it.

The overhead way can, of course, only be used when there are trees, telegraph poles, or suitable buildings. The wire should never be lower than 17 ft. above the centre of the road, to avoid obstruction to traffic.

3. "House" Crossing. When it is necessary to lay cable through towns or villages, there are two possible ways of laying it: airline above ground, or pegged down at the bottom of the house. Overhead is best, but longest. The cable can be made fast with strong string or spun yarn. Care must be taken that the cable itself shall never be tied round an iron holdfast.

4. "Tree" Crossing. This method should not be used more often than necessary; it entails a lot of unnecessary work and equipment. The cables must be laid loosely, as the wind shaking the boughs is inclined to break it.

5. "Field" Crossing. This is by far the simplest method. But it must be remembered that if the cable is likely to remain there any

length of time, it should be raised off the ground, or it may be affected by the damp, which rots the wire and causes short circuiting.

It may be laid along hedges, but it must be pegged down if it has to pass a gate or gap.

1. Never lay the cable in water.
2. If two or more wires are run out from the same place, they and their earths should be laid as far from each other as possible to avoid induction.
3. When there are numerous wires to one station, they should be ticketed at intervals with the station call and name of units they join together. This is a great help to linesmen.

3. Method of dealing with Messages

A register of all outgoing messages should, whenever possible, be kept. They should be numbered in sequence on the form, and a note kept of the sender's number. The N.C.O. or man in charge of a station, who for the time being is also "Signal Master," is responsible in seeing that all messages that pass through his station are filed and registered. The actual register should be kept by the "Signal Clerk," whose duty it is to do all registering in the station, including the despatch rider's roster.

The message is handed to him, and he fills in prefix, code time, office of origin, and counts, and then hands it to the operator. When it has been transmitted it is returned to the "Signal Clerk" as sent, and he files it. Three copies should be taken of all incoming messages, two to be sent to addressee, and one filed.

All messages which pass through a station must be filed. If no register forms are available a very simple register may be made on the back of a message form as follows:

PLACE..... DATE.....

No.			

4. DUTIES OF SIGNAL MASTER

1. Make himself acquainted with the position of all units in his Brigade, Divisional Headquarters, and units on his flanks.

2. Obtain early and full information of all moves and operations.

3. Obtain daily and pass to all stations the divisional time.

4. If his O.C. goes away, ascertain where, by what route, and likely hour of return.

5. Generally supervise the interior working of his section.

6. Be responsible as to the method of despatching a message, *i.e.* by visual despatch rider or telephone.

7. Be responsible that the position of Battalion Headquarters is at once notified to Brigade Headquarters and other units necessary.

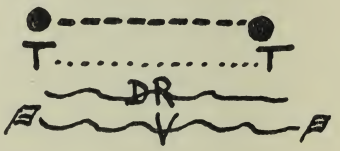
8. On a move taking place, he will leave a man

to guide Staff Officers, Despatch Riders, etc., to new Headquarters.

9. Be prepared to assist his O.C., or Adjutant, as long as this does not entail neglect of his own work.

10. Keep a plan showing all communications to his office, using the following signs to indicate the form of communication:

Vibrator.
Telephone.
Despatch Rider.
Visual.



5. Duties of Signal Clerks

1. Keep the signal register of outgoing messages.

2. Keep a file of "Top Copies" of all messages received by cable, signal, or telephone.

3. Keep a file of all receipts.

4. Be responsible that all despatch riders who come to his office obtain their receipt without delay.

5. Obtain divisional time and keep it.

6. Be responsible for the rationing of all orderlies, operators, etc., who belong to, or enter, his station.

7. Notify the Signal Master of any outside communication which is being used.

8. Ascertain when the representatives of units have arrived, and report to the Signal Master.

9. Keep himself acquainted with all moves.

10. Keep a diary, showing all matters in connection with the Signal Office.

6. Duties of Field Clerk

1. Keep his Commanding Officer's message book and files of messages received and sent.

2. Never leave his Headquarters, unless relieved or specially ordered to do so.

3. Make himself acquainted with all abbreviations, and index letters used in his Division.

7. Messages

The difficulties which signallers have to contend with in warfare make it almost essential, whenever possible, to duplicate the methods of communicating. The methods under ordinary circumstances are numerous, the most important being:

1. Flags.
2. Heliograph.
3. Lamp.
4. Despatch Rider.

In open warfare these methods are not so difficult, but in trench warfare they may be dealt with as follows:

1. A small blue flag.
2. A lamp with a concentrated light.

1. A small blue flag as long as there is enough background behind the sender to keep him out of the enemy's sight, which may be answered by a small blue flag, as long as the answered is out of the range of the enemy's vision.

The following is a rough table made with a quarter-size blue flag. (Note Fig. 1, p. 16.)

FIG. 1.

FIG. 2.—SMALL FLAG SIGNALLING.

(i) With open ground:

Small 1 ft. flag up to 600 yards with naked eye.

Small 1 ft. flag up to 1,500 yards with telescope. (Depending on atmospheric conditions, this may be read further.)

(ii) With dark background:

(*a*) Sender in shade only 100 yards with naked eye.

(*b*) Sender in the sun only 200 yards with naked eye. These may be read at three to four times the distance with the telescope.

2. The other alternative is the lamp, which has proved of use both by day and night for signalling. There should be one straight shot between the two points to be in communication. The light should be concentrated by covering the lamp with a piece of darkened tin, leaving a small aperture for it to come out by, or by using special iron tubes.

The following sized pipes have been used, and give a good light up to 2,000 yards when read with a telescope:

	ft.	in.
Length of pipe . . .	5	0
Diameter of outer pipe . .	0	2
Diameter of smaller pipe sliding in outer pipe . . .	0	$1\frac{1}{2}$
Large aperture for day . .	0	1
Medium aperture for night .	0	$0\frac{5}{8}$
Smallest aperture for night .	0	$0\frac{3}{8}$

Telescopes or glasses require firm rest to align them on the distant station.

At night moisture often condenses on the lenses obscuring the vision, and they must be frequently wiped. Wires should as often as possible be duplicated. If they are only likely to come under fire in certain positions, only those parts which come under fire need be duplicated.

8. Care of Cables

The first essential in laying a cable is that the metal conductor be continuous; there must be no break in the cable, and all joints, if not permanent, must be pinched up tight with pliers, and must be waterproof. The insulation must be good, otherwise, although there may be no break, any bare wire touching a conductor, such as a tree or the ground, will cause a great leakage of current which may seriously interfere with the signals. The great enemy of the telephone is moisture, and all care should be taken to keep the instrument and cable free from damp. Empty drums should not be left lying about in the sun. Should the wire be broken or cut, there are three possible ways of mending it:

1. Temporary joints.
2. Semi-permanent joints.
3. Permanent joints.

1. When a temporary joint has to be made in a piece of cable in the field, as at the end of a drum, or where a break has occurred, the insulation will be stripped off the cable for about 3 inches from a point 1 inch from the end. A piece of india-rubber tubing 5 or 6 inches long, will be slipped along one of the cables, and the ends will be tied

together by a reef knot in the bared portion. This knot should be tied as tight as possible to ensure contact. The tubing will be then drawn over to insulate the joint.

2. If it be likely that some time may elapse before a suitable opportunity presents itself for running through the cable and making a permanent joint, it may be desirable to make a semi-permanent joint, if the wire is broken. To do this clean the ends of the cable with sandpaper and proceed as in a temporary joint. The reef knot should be tightly pinched with pliers, then cut the loose ends off close; bind with insulation tape.

3. To make a permanent joint, remove about 3 inches of insulation, clean ends of wire carefully. Tie the bared ends into reef knots, before pulling tight, place a piece of copper wire inside, then pull tight with pliers, cut off the ends of cable short and bind the copper wire round the cable each way. Then solder the ends and the knot and bind with insulation tape, being careful to make the latter overlap the original insulation by half an inch on each side. Make all joints permanent as speedily as possible.

9. Transmission of Messages in the Field

Although the telephone portable "D" was originally intended for the transmission of messages by word of mouth, it has been found as a rule quicker and more accurate to send them on the vibrator. Messages should be treated in the same manner as if visual, all signs, etc., being counted in the same way.

When a message is transmitted verbally the following procedure should be adhered to:

Sending	Receiving
(i) Call up distant station by pressing vibrator push piece.	On hearing a call, reply in the same manner.
(ii) On hearing answering call, say, "Message for" and name the unit as shown in address.	Get ready pencil and paper, and say "Go on."
(iii) Dictate the message slowly, three or four words at a time, selecting the words according to the sense of the message.	Write down the message as dictated, repeating each word as you write it down. Do not repeat the last word until you have written it down.
(iv) Spell out all names of persons and places, and all words written in capitals.	Write down the words in block letters, and repeat the spelling.
(v) Transmit figures thus: 10066. "Figures—one, double o, double 6. Ten thousand and sixty-six."	Write down the figures as you receive them, and check back in the same answer.
(vi) When you have finished the message say, "Message ends."	Repeat the whole message.
(vii) When the message has been correctly repeated say, "Correct," and if you have no other message, say "Good-bye."	Say "Good-bye."

10. The Message Form

Messages should always be sent on A.F. C2121, the "A" form being used for sending, and the "C" (pink) form for receiving.

Owing to the necessity of keeping messages as short as possible, only the name of the unit will be put in the address, and only the name of the company, if it is from the unit to which the company belongs; all such titles as O.C., Col.,

Adjt., or H.Q.RS. should be avoided; words like "please", and unnecessary brackets or underlining should also be avoided in the text.

No name of place should ever be put in the address FORM; if the message gets into the enemy's hands it gives the position of stations, and also gives unnecessary work in the signal office.

A consecutive index number should be kept each day, and the number printed in space "Sender's number," with the initials or index letter of the sender; this enables the addressee, when replying to a message, to refer to in space "in reply to," instead of quoting bits of the substance.

The following index letters are usually adopted in Infantry Divisions:

"G" for General Staff.
"Q" for Administrative Staff.
"B.M." for Brigade Major.
"S.C." for Staff Captain.
"F" for Artillery.
"E" for Engineers.

Messages must be franked in space "Z" by the officer sending them, or by the officer or Field Clerk authorised by him.

N.B.—All communication must be from Signal Office to Signal Office.

II

GENERAL RULES IN THE FIELD

1. More haste less speed. Lay the cable carefully, and it will save time afterwards.

2. Avoid tapping wires, it destroys the insulation.

3. In attacks when telephones are used to join firing line and supports, it must be remembered that while being operated, the telephone must be stationary. Telephones cannot be fixed up in a second.

4. When it is necessary to move forward leave the wire behind in case of retirement; there will be plenty of time to wind it up afterwards.

5. "Communication must be maintained at all times between all parts of an outpost position and between the outposts and the main body." Never lay the cable until the outpost line has been taken up, and until the position of pickets is settled.

6. Obtain early information of moves.

7. When stations are fixed, obtain a uniform time, if possible, from Divisional Headquarters, and pass to all stations. In the trenches divisional time should be obtained each morning.

8. Avoid laying the wire near anything which is a conductor to electricity.

9. D1 cable may be laid in water for about forty-eight hours but not longer, then only when

it is good wire and has no joints. Enamel wire will stand the wet much longer.

10. Joints should always be made permanent when time and opportunity permit.

11. Road crossings should be 18 ft. above the middle of the road.

12. Always duplicate wires when possible.

13. If the wire has to be laid for a long distance, study the map well first to get the lie of the ground. It may help you to find the base, if necessary, in the dark, and will assist the reeling-up party, if one of the members knows how the cable was laid.

14. Make notes of the road in your mind as you go along.

15. If the cable has to be laid extra fast, a strengthening party should be left behind to clear the wire and to make it fast.

16. If communication fails or cannot be obtained, never waste time; first check all the connections on instrument battery, etc., and then send out a linesman.

17. The linesman should have an instrument and earth pin and should tap in first about 50 yards from the instrument, and then not more often than every 400 yards, unless he thinks he has found a fault. If the other station has done its duty, the linesmen should meet half way, and should both return at once to their respective stations.

18. The thicker the wire the longer it lasts.

III

TRENCH WARFARE

11. Signal Officers

The officer in charge of signals of the unit to which he belongs is responsible for the maintenance of communication within his unit, with the units on his flanks if necessary, and also in assisting the Brigade Signal Officer in maintaining communication with his unit. There should be the closest possible touch between the signalling officer and his commanding officer and adjutant, and he should receive early and full information of proposed moves or attacks.

Care should be taken not to allow signal stores to get down too low, and indents should be sent in to the Signal Park well in advance for all necessaries. He should be in close touch with the headquarters of his supporting artillery, and should be prepared to assist in the laying of wires, for artillery forward observing officer, if that observing officer is in his own part of the trenches.

12. Line Work

The security of lines is more important than rapidity of laying. D1 cable should not be laid on the ground for any length of time, as it deteriorates, and the signals will become dull. Enamel wire may be buried about 2 ft. below the ground,

deep enough to be secure against shrapnel and rifle fire. Cables may be laid in numerous ways; here are some of them:

1. Pegged to the vertical side of the trench about 1 ft. off the top, with wooden pegs or bent wire.

2. Laid just outside the trench within reach of a man in the trench.

3. Laid across country out of reach of the trench altogether.

4. Buried about 2 ft. under the ground across country, or about 6 in. in the bottom of the trench, if the trench is dry enough.

5. Raised on poles about 3 ft. off the ground.

6. Threaded through drain-pipes or lead-piping. This is especially useful when it is necessary to cross a number of communication trenches, when the piping may be bent in the shape of trench (Fig. 3).

The other way of crossing communication trenches is by having the wire fixed up on poles, high enough to be out of reach of a man passing underneath with his rifle over his shoulder (Fig. 4).

7. Laid as far in front of the front-line trench as possible, *i.e.* when it is necessary to connect the flanks of a battalion, or two companies, in the front line.

Cable lines should be laid permanently, therefore should be laid carefully.

Whenever possible, alternative channels of communication should be provided either by means of duplicate wires or by a transverse line connecting the terminals of two or more lines, this transverse line being put through whenever a line is broken. These duplicate or transverse lines, if not in use, should be frequently tested.

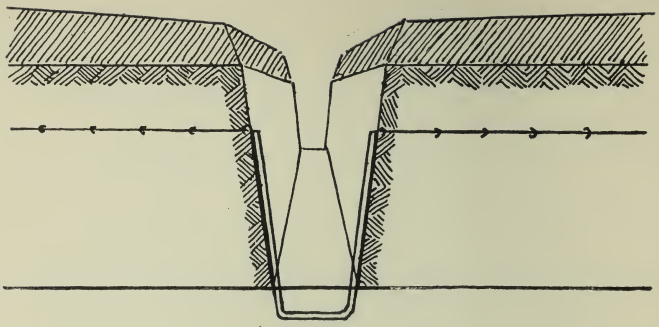


FIG. 3.

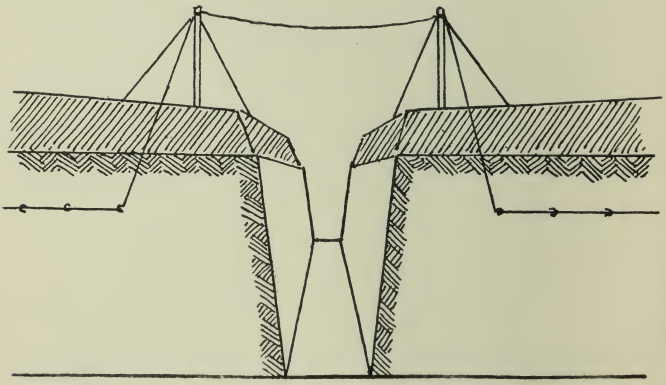


FIG. 4.

Wire netting, if raised off the ground, forms a very good connection. Since cable is more often laid by night than by day, as much attention as possible should be paid to this when training signallers. They should do a great deal of cable laying in trenches at night.

13. Signal Officers

In trench warfare all signal offices should be in dug-outs. The personnel used in a battalion signal office depends on the number of men available; the following would probably be required in a Battalion Headquarters dug-out:

Signal Master (officer or N.C.O.).
Signal Clerk.
Counter Clerk.
Operators.
Check.

The O.C. Headquarters dug-out and the Signal Office dug-out should be adjoining but not the same.

The dug-out should be arranged something like the plan of a Battalion Headquarters' dug-out (Figs. 7 and 8).

Farm-house cellars are very useful, anywhere in fact away from noise. Signallers should be relieved every twelve hours. They should be taught to at once arrange themselves in such a position with regard to one another that the work may be carried out with the utmost efficiency.

Infantry battalions are now furnished with switchboards; when they are in use, it is not necessary to have more than two instruments at the Headquarters dug-out.

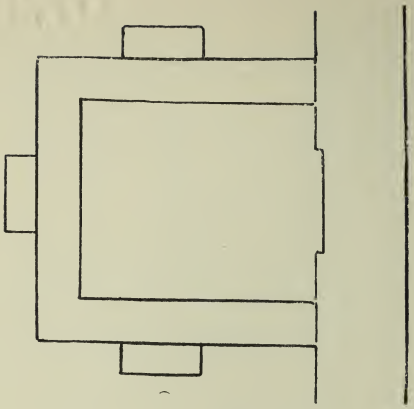


FIG. 5.

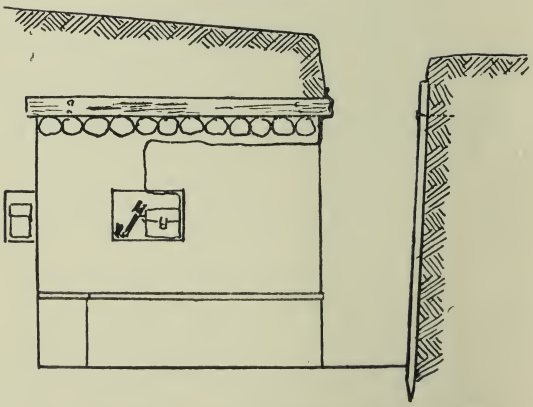


FIG. 6.—COMPANY HEADQUARTERS DUG-OUT.

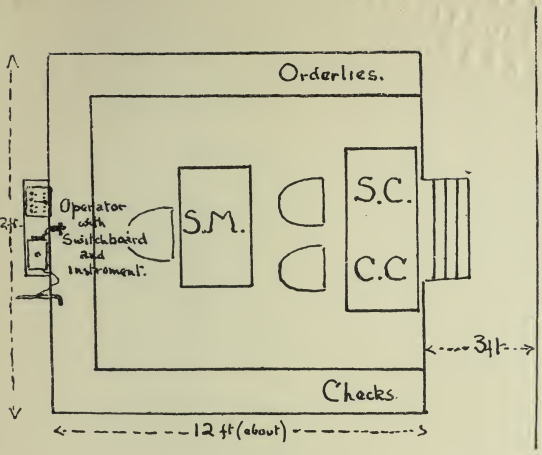


FIG. 7.

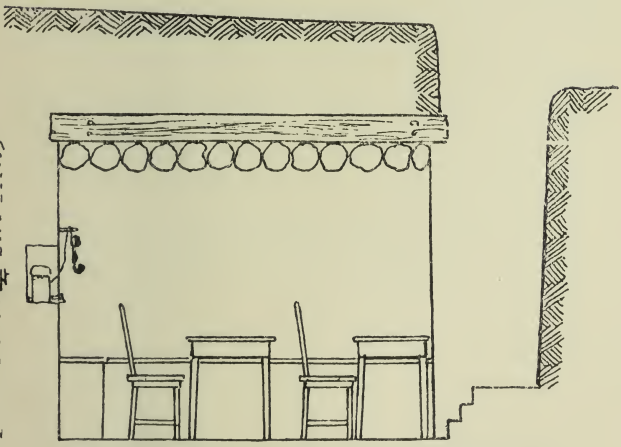


FIG. 8.—BATTALION HEADQUARTERS DUG OUT.

Signallers should be instructed in the use of the switchboards before leaving for abroad.

14. The Signaller

A signaller's task is perhaps one of the hardest to perform in war; it requires courage and endurance, only attained by the highest efficiency and discipline. The officer, N.C.O.'s and men should work in close conjunction, and should thoroughly understand one another's capabilities. In training there should be a certain amount of competition, which encourages each man as an individual to excel.

It must be remembered that, unlike the ordinary soldier, signallers work in small parties and isolated stations, and enjoy none of the moral support which large numbers and ability to reply to the enemy's fire with his own weapons, give to his comrades in the firing line. His work carries with it the burden of individual responsibility; countless lives may be sacrificed through his loss of nerve or lack of resource. He should be made to understand that, if given a message to deliver, it MUST be delivered at all cost, no matter how great the risk.

The signaller must eliminate the word "impossible" from his vocabulary, and never admit the idea of failure in connection with his duty.

Printed by Hazell, Watson & Viney, Ld., London and Aylesbury.

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